Claims

We claim:

1. A time duration indicating system for a product that includes a volatile component, the system comprising:

a substrate, and

a volatile dye,

the volatile dye being coated onto the substrate thereby coloring the substrate, the volatile dye evaporating over time resulting in a color change for the substrate.

2. The time duration indicating system of claim 1, wherein the volatile component is an insecticide.

3. The time duration indicating system of claim 2, wherein the insecticide is a pyrethroid.

4. The time duration indicating system of claim 2, wherein the insecticide is selected from the group consisting of transfluthrin, vapothrin, permethrin, prallethrin, tefluthrin and esbiothrin.

5. The time duration indicating system of claim 1, wherein the volatile component is N,N-diethyl-m-toluamide.

6. The time duration indicating system of claim 1, wherein the volatile dye is guaiazulene.

7. The time duration indicating system of claim 1, wherein the volatile dye is guaiazulene and the volatile component is transfluthrin.

8. The time duration indicating system of claim 1, further comprising a solvent, the volatile dye being dissolved in the solvent to form an intermediate solution, the substrate being coated with the intermediate solution.

9. The time duration indicating system of claim 8, wherein the solvent is selected from the group consisting of ISOPAR™ C, ISOPAR™ E, ISOPAR™ L, heptane, methanol, acetone, ethanol, isopropyl alcohol, dodecene and tetrahydrofuran or mixtures thereof.

10. The time duration indicating system of claim 1, wherein the substrate is made from a material selected from the group consisting of cellulose, matted glass fibers, paper, ceramic, felt, woven fabric, nonwoven fabric, and polymeric powders or mixtures thereof.

11. The time duration indicating system of claim 1, further comprising a retarder selected from the group consisting of hexadecane, tetradecene, transfluthrin, dodecene, N,N-diethyl-m-toluamide, vapothrin, permethrin, prallethrin, tefluthrin, and esbiothrin.

12. The time duration indicating system of claim 1, further comprising a reference template having a color substantially the same as the substrate coated with the volatile dye and prior to any substantial volatilization of said dye.

13. The time duration indicating system of claim 1, further comprising a reference template having a color substantially the same as the substrate after substantially all of the dye has been volatized.

14. The time duration indicating system of claim 1, wherein the volatile component is an insect repellant.

15. A method for indicating an end of life of a product that includes a substrate coated with a volatile component, the method comprising:

coating the substrate with a volatile dye thereby coloring the substrate, the volatile dye volatilizing over time resulting in a color change for the substrate.

16. The method of claim 15, wherein the volatile dye is guaiazulene and the volatile component is an insecticide.

17. The method of claim 15, wherein the volatile dye is guaiazulene and the volatile component is transfluthrin.

18. The method of claim 15, further comprising the steps of

providing a solvent, and

mixing the volatile dye with the solvent to form an intermediate solution,

wherein the coating step further comprises coating the substrate with the intermediate solution.

19. The method of claim 18, wherein the intermediate solution further comprises a retarder.

20. The method of claim 18, wherein the retarder is selected from the group consisting of hexadecane, tetradecene, transfluthrin, dodecene, N,N-diethyl-m-toluamide, vapothrin, permethrin, prallethrin, tefluthrin, and esbiothrin.

21. The method of claim 15, further comprising the steps of

providing a retarder, and

mixing the volatile dye with the retarder,

wherein the coating step further comprises coating the substrate with the volatile dye and the retarder.

22. The method of claim 20, wherein the retarder is selected from the group consisting of hexadecane, tetradecene, transfluthrin, dodecene, N,N-diethyl-m-toluamide, vapothrin, permethrin, prallethrin, tefluthrin, and esbiothrin.

23. An insecticide product with an end of life color change indicator, comprising:

a substrate,

a volatile insecticide coated onto the substrate, the volatile insecticide selected from the group consisting of transfluthrin, vapothrin, permethrin, prallethrin, tefluthrin and esbiothrin, and

guaiazulene coated onto the substrate.

24. The insecticide product of claim 23, further comprising a reference template disposed adjacent to the substrate and having a color substantially the same as the substrate coated with the guaiazulene dye and prior to volatilization of the guaiazulene dye.

25. The insecticide product of claim 23, further comprising a reference template disposed adjacent to the substrate and having a color substantially the same as the substrate after substantially all of the guaiazulene dye has been volatized.